OCEANA SENSOR TECHNOLOGIES
Sensors for Smart Products

Smart Wireless Sensors in an Open System Architecture

Defense Science & Technology Seminar on Emerging Technologies

Condition-Based Maintenance / Predictive Diagnostics

17 July 2000

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President

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Industry/Academia/Government Partnership

OCEANA SENSOR TECHNOLOGIES
Sensors for Smart Products

BOEING

CATERPILLAR

MIMOSA

OCEANA SENSOR TECHNOLOGIES
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Rockwell Automation

Rockwell Science Center

PENNSTATE ARL

Wireless Smart Sensors
Open System Architecture
for CBM/PHM

OFFICE OF NAVAL RESEARCH

Program Executive Office Aircraft Carriers

JOINT STRIKE FIGHTER

DARPA

Why OSA CBM?

OCEANA SENSOR TECHNOLOGIES
Sensors for Smart Products

- Ease of Component Integration for Solution Offering
- Faster Market Development
- Lower Cost

= Greater Profitability.

Key OSA Technologies

OCEANA SENSOR TECHNOLOGIES
Sensors for Smart Products

- Internet Connectivity HTTP/TCP/IP
- Standard Language CBM XML
- Bluetooth™ Wireless Technology
- Standard Transducer Object Model IEEE 1451

AAAV CBM (ONR TOC FNC Funded)

OCEANA SENSOR TECHNOLOGIES
Sensors for Smart Products

Application Platform

Platform Health Monitoring

Operational Commander

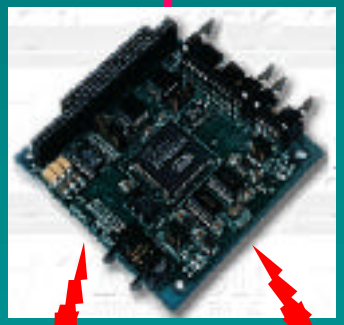
In-stride Logistics

Technical Support

Platform Information Network

SHM™

System Health Monitor



- CPU & Controllers
- Information Network Interface
- Information Archive, prognostics

Bluetooth Wireless Technology Link

ICHM™

Intelligent Component Health Monitors

ICHM™ 1
Intelligent Bearing Health Monitor

ICHM™ 2
Intelligent PTM Health Monitor

ICHM™ "N"
Intelligent Component Health Monitor

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The Future of PHM/CBM

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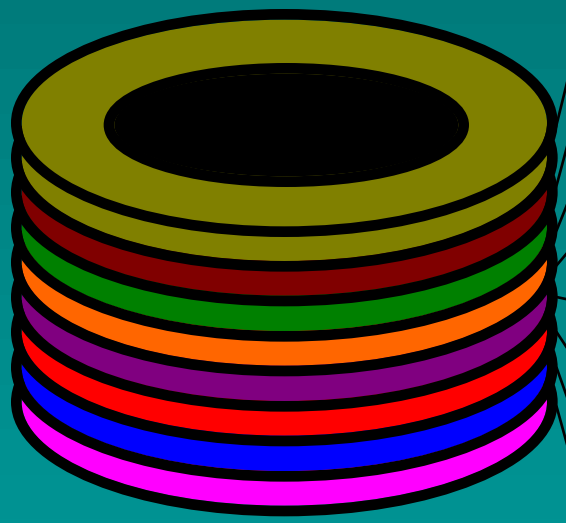
Sensors for Smart Products



- Communications
- Diagnostic Processor
- General Purpose Processing
- Signal Processing
- Signal Conditioning
- Power Interface/Generation
- Sensing Elements
- Self-calibration/Active Cancellation

Intelligent Component Health Monitor

Wireless ICHM™ Architecture

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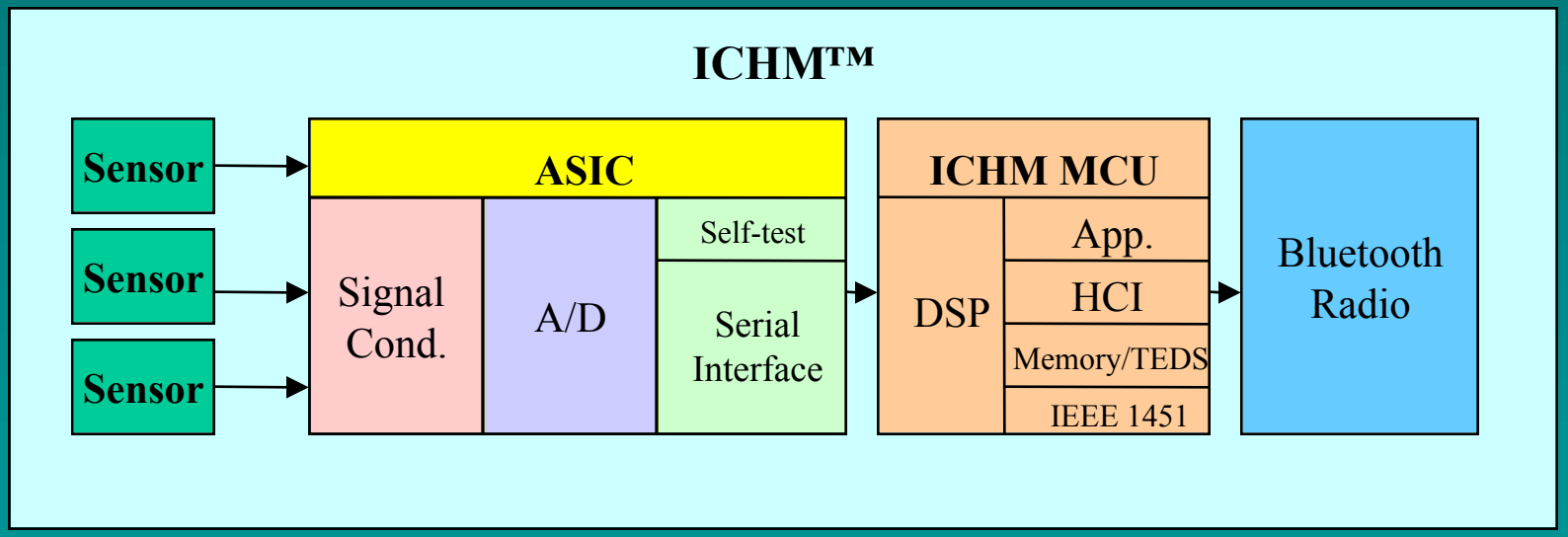
Sensors for Smart Products



IEEE 1451

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.1 Defines Standard Transducer Object Model

.2 Defines the interface for integration of digital sensors to microprocessors

- Physical interface
- Transducer Electronic Data Sheet (TEDS)
- Protocol

ICHM™ - ASIC

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Sensors for Smart Products

- Signal Conditioning
  - Low noise preamplifier - buffer, filters
- Analog-to-Digital Converter
  - Delta-sigma architecture
  - Single supply (3-5 V)
  - Adaptive response: tradeoff resolution vs. bandwidth vs. power consumption
- Self-Test

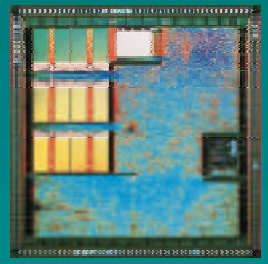
ICHM™ MCU & Bluetooth Radio

OCEANA SENSOR TECHNOLOGIES
Sensors for Smart Products

- Micro-Controller Unit (MCU)
  DSP Algorithms, IEEE 1451, Radio Host Controller Interface (HCI)
- Memory
  Program, Data, TEDS, Calibration
- RF communications
  - Low Cost ($5)
  - Multiple access
  - Secure
  - Low power, ISM band
  - 1 Mbit/sec Bandwidth
  - Send & receive

ICHM™ Plan

OCEANA SENSOR TECHNOLOGIES
Sensors for Smart Products



In 2001 ~ 1 in. Cube

Military/Commercial

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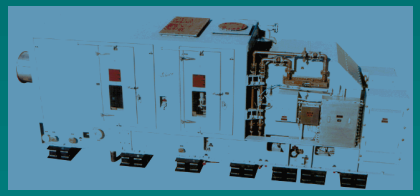
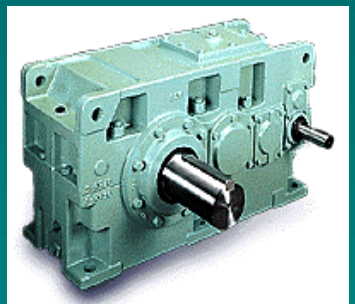









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